

## ***Regarding Claim Objections***

### **Claim 16 (currently amended)**

Please amend claim 16 to correct a grammatical error, as per PTO examiner's request – add article 'a' in between "operation of" and "hard disk drive system":

Originally:

*An improved operation of hard disk drive system capable of a plurality of simultaneous reads and/or writes on different platters, surfaces and/or angles, wherein the disk drive system interface and/or supported command/communication protocol is/are capable of accepting future operation profile information from the host system, for the purpose of optimizing the operation of the disk drive system (most importantly, movement of head arms)*

Amendment:

An improved operation of a hard disk drive system capable of a plurality of simultaneous reads and/or writes on different platters, surfaces and/or angles, wherein the disk drive system interface and/or supported command/communication protocol is/are capable of accepting future operation profile information from the host system, for the purpose of optimizing the operation of the disk drive system (most importantly, movement of head arms)

### **Claim 17 (currently amended)**

Please amend claim 17 to correct a grammatical error, as per PTO examiner's request. This claim was also rejected as indefinite and unclear (quote):

Claims 17 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 17, line 1, "or other" is unclear. What other hard disk drive system is being claimed other than the one in claim 16? The phrase "or other" should be removed.

The claim does not relate to a hard drive but to improved operation of it described in the claim itself, that is the capability to receive multiple commands from the host.

Phrase "or other" is only the beginning of phrase "or other hard disk drive system capable of a plurality of simultaneous reads and/or writes on different platters, surfaces and/or angles" which was introduced in the first amendment to this claim to remove complex dependencies to all claims from 8 to 16, describing various functionalities in various embodiments of the hard disk drive to which this claim applies.

Originally:

*An improved operation of claim 16 or other hard disk drive system capable of a plurality of simultaneous reads and/or writes on different platters, surfaces and/or angles, wherein the disk drive system interface and/or protocol is/are supported command/communication capable of accepting a plurality of commands from one host and/or more clients by queuing them, optimizing the operation of the disk drive system and being able to reorder the execution of these commands.*

Amendment:

An improved operation of claim 16 or other hard disk drive system capable of a plurality of simultaneous reads and/or writes on different platters, surfaces and/or angles or other embodiment of hard disk drive system as per this invention, wherein the disk drive system interface and/or protocol is/are supported command/communication protocol is/are capable of accepting a plurality of commands from one host and/or more clients by queuing them, optimizing the operation of the disk drive system and being able to reorder the execution of these commands.

***Regarding Claim Rejections – 35 USC § 112*****Regarding Claim 17**

Amendment to claim 17 was already included previously in this response.

**Regarding Claim 18**

The phrases starting with "limited or not limited" explicitly describe the flexibility or degrees of freedom of this claim as it is not restricted to being applicable to any particular situation. This has to be explicitly stated as it would otherwise be unclear as to what can the claim be applied. Phrased differently, the claim adds two-way communication improvement to claim 17 with one or more hosts, however limited (or not).

Please amend claim 18 as follows, to make it clearer:

Original:

*An improved operation of claim 17 wherein the disk drive system interface and/or supported command/communication protocol is/are capable of simultaneously receiving new commands and new data and sending any requested data back to any host or client, limited or not limited to supporting two-way communication only with one host or client at a time, limited or not limited to supporting the two-way communication with two different hosts/clients at a time only.*

Amendment:

An improved operation of claim 17 wherein the disk drive system interface and/or supported command/communication protocol is/are capable of simultaneously receiving new commands and new data and sending any requested data back to any host or client, regardless how many hosts or clients are supported for two-way communication ~~limited or not limited to supporting two-way communication only with one host or client at a time, limited or not limited to supporting the two-way communication with two different hosts/clients at a time only.~~

## **Regarding Claim Rejections – 35 USC § 102**

### **Regarding Claims 16 and 17 and U.S. Patent 6,496,899 (DeMoney)**

DeMoney's device is a system of hard disk drives, where my device is a hard disk drive system.

Word "system" is defined by Merriam-Webster® dictionary as follows:

a regularly interacting or interdependent group of items forming a unified whole <a number *system*>: as **a** (1) : a group of interacting bodies under the influence of related forces <a gravitational *system*> (2) : an assemblage of substances that is in or tends to equilibrium <a thermodynamic *system*> **b** (1) : a group of body organs that together perform one or more vital functions <the digestive *system*> (2) : the body considered as a functional unit **c** : a group of related natural objects or forces <a river *system*> **d** : a group of devices or artificial objects or an organization forming a network especially for distributing something or serving a common purpose <a telephone *system*> <a heating *system*> <a highway *system*> <a data processing *system*> **e** : a major division of rocks usually larger than a series and including all formed during a period or era **f** : a form of social, economic, or political organization or practice <the capitalist *system*>

In my invention the word "system" denotes not a system of multiple hard drives, but a system of closely interacting components of a single hard disk drive. This is clearly indicated in the description of the invention. The invention also does not have any claims to the multiplicity of hard disk drives.

DeMoney's device refers to the "system" as a "collection" of hard disk drives. In his invention the word "system" is also clear and unambiguous.

It is not incorrect to use the word "system" for any of the meanings and, therefore, I should not be required to remove it from the description of my invention. Examples:

"Hard Disk Drive System" – a system composed of components inside a single hard disk drive. Note that word "Drive" is in singular form.

"Hard Disk Drives System" or "System of hard disk drives" – a system composed of multiple hard disk drives. Note that word "Drive" in first alternative is in plural form.

"A computer system" – a system composed of computer components, such as CPU, busses, caches, memory, peripheral interconnects, hard disk drives, etc. This is a single computer.

"Political system" does not denote multiplicity of various "political systems" but a single set of rules that comprise that "political system", whereas not all the rules are the same and are "components" of the system.

Furthermore, usage of word "system" was not ambiguous even to the examiner as first office action references existing patents that are not "systems of multiple hard disk drives" but instead "systems of components that make a single hard disk drive". Therefore the requirement to remove the word from the description of the patent or suggestion that the patent has to be further examined is improper. Word "system" is appropriately used and was correctly interpreted in the first office action, indicating that there is no need for reexamination.

My invention does not clash with DeMoney's. In fact, they can be used together. DeMoney's device organizes the work-load of multiple hard disk drives and re-orders commands itself. My device handles this internally to the hard disk drive. In fact, DeMoney's device or slight improvement of it can be used with embodiments of my invention. This would further improve the performance as seen by the host/client of DeMoney's device.

DeMoney's and my invention possibly appear to be doing similar things, but they do so at different levels, for different reasons and with different internal knowledge and algorithms in mind. DeMoney's device can only make assumptions about internal structure, capabilities and current state of each hard disk drive connected to it. My invention operates at the embedded

level and is capable of being aware of the entire state of its system components such as current locations and motions and number of actuators and heads, their capabilities, sensitivities and defects, current phase (angle) of disks and rotation speeds and more.

This is analogous to data caches (e.g. disk, memory). Although they all appear to be doing more or less the same thing, they have different sizes and different goals. CPU's Level 1 (internal) cache is very high speed, very close to CPU and better aware of CPU's needs. Yet because of the same reasons it is limited in size. Level 2 (and 3) caches seemingly perform the same functionality but they have a different goal – to compensate for memory speed and Level 1 cache size and other shortcomings and use different algorithms. Similar is true for my and DeMoney's devices.

### **Regarding Claim 18 and U.S. Patent 6,496,899 (DeMoney)**

As mentioned in my response regarding claims 16 and 17 and DeMoney's invention, his invention operates at entirely different level. Same applies here, in regards to claim 18. In a system comprising of both DeMoney's device and (multiple) embodiments of my invention, my claim 18 would relate to communication between embodiments of my invention and DeMoney's device, not between DeMoney's device and the host for the entire system.

Furthermore, as the examiner clearly points out, DeMoney does not disclose that "these things happen simultaneously" (two-way communication).

The claim is also rejected on the basis that it would have been obvious to one of ordinary skill in the art at the time the invention is made to receive the new commands and new data simultaneously to simplify data reception process". The fact is that after decades of computer and hard disk drive system development (first hard disk drive for microcomputers was produced by Seagate Technology in 1980), which is roughly half of the entire evolution of electronic computer and more than that for today's computing architectures, communication interfaces are still half-duplex and operate only in large chunks, with significant latency associated with switching communication directions. That alone suggests that even to the

experts in the field, such as DeMoney, it was not obvious. Also, this does not simplify data reception process in any way but actually makes it much more complex, further showing that this would not have been obvious to one of ordinary skill in the art even at present, let alone at the time the invention was made. The reason why this may not have been obvious is widely established implementation of electric communication interfaces that would require either increased bandwidth (already a bottleneck) or multi-channel architecture (at least one per direction). However, current technologies such as fiber-optics and serial interfaces do allow full-duplex or equivalent interfaces to be created.

Furthermore, another reason for this not being obvious is the fact that current hard disk drives do not need to communicate both ways simultaneously as they are unable to handle this internally. Only a single head can be utilized at any given time and it can only read or write, but not both at the same time. From that perspective two-way communication could introduce some benefits but not as significant as in the embodiment of my invention, which is the device capable of actually handling a multiplicity of each type of operations in parallel – for example 4 reading streams and 6 writing streams at the same time.

My invention, therefore, relates to operational utilization of bidirectional communication interfaces, exposing the benefits for them when used in conjunction with my invention. DeMoney's invention does not have any similar provisions as it is intended to operate with prior art hard disk drives, not devices created as per my invention.

Examiner also states that performance increase would have been obvious to one of ordinary skill in the art. It, in fact, is not obvious, and may not be true especially depending on the particular embodiment. In half-duplex implementations performance may actually suffer due to overhead of switching from one direction to another. As the statement in office action is incorrect it clearly means that it is not "obvious to one of ordinary skill...".

Examiner further states although that "DeMoney's does not disclose either of these techniques" it neither precludes them and that "it would have been obvious...". It is already very clear that this feature is not obvious, as per comments above. Also, a patent cannot claim